REMARKS

Claims 14-37 are now pending in the application. Claims 14-19 were withdrawn from consideration pursuant to 37 CFR §1.142(b). The Examiner indicated that Claims 22, 24, and 33–35 had allowable subject matter, but were objected to for being dependent upon a rejected base claim. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 20, 21, 23, 25-32, 36 and 37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ayers (U.S. Pat. No. 4,466,869), hereinafter "Ayers" in view of Williams, et al. (U.S. Pat. No. 4,414,080) hereinafter "Williams". This rejection is respectfully traversed.

The present invention relates to corrosion protection of a photoelectrode device. Claim 20 recites a semiconductor layer having a first major surface coated with an indium tin oxide (ITO) layer having a thickness of greater than 3000 Angstroms. The thickness of the ITO layer unexpectedly provides a corrosion protection effect.

The Ayers reference relates to photolytic devices having a photoelectrode, which may include semiconductor materials adjacent to a photocatalytic layer that contacts electrolyte. The photocatalytic layer may include indium and tin oxides where the semiconductor is an n-type (Col.3 lines 59 and 65). However, there is no recognition of any potential issues with corrosion in Ayers, and as such, there is no suggestion or motivation to provide a layer of ITO that is at least 3000 Angstroms thick, which serves to prophylactically minimize or prevent corrosion. The Ayers reference does not teach,

suggest, or provide any motivation to protect the photoelectrode from potential corrosion.

The Williams reference also fails to provide any teaching, suggestion, or motivation for an ITO layer having a thickness of greater than 3000 Angstroms to prevent corrosion issues in a photoelectrochemical device. Williams discloses a polymeric "mediator" film that is coated over the semiconductor surface to improve the electrical interface with an electrolyte (see Figure 2, col. 5 lines 22-24 and lines 32-35). The polymeric mediator film can include catalysts to facilitate and promote electron transport between the interface of the semi-conductor and the electrolyte (see col. 5 lines 1-10 and lines 22-35). There is, however, no disclosure or suggestion to use a transparent conductive oxide (TCO) at the semiconductor surface for any reason. Further, there is no disclosure or suggestion in Williams of providing an ITO layer having a thickness of greater than 3000 Angstroms.

Applicants respectfully disagree with the Examiner that the thicknesses disclosed in Williams at col. 6 lines 14-16 have any bearing on the claims of the present invention. The Williams reference refers to a thickness of a polymeric film or matrix, which is distinct from and unrelated to oxide layers. The Williams teaching concerning an entirely different material for an improved electrical interface provides no useful information to the skilled artisan faced with a corrosion problem.

To establish a *prima facie* case of obviousness, the Examiner must show, *inter alia,* that the prior art references teach or suggest each and every claim limitation when combined, and also that the prior art references suggest to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed

process. *See, e.g., In re Vaeck*, 20 USPQ.2d 1438 (Fed. Cir. 1991) and *In re Oetiker,* 24 USPQ.2d 1443 (Fed. Cir. 1992). Applicants submit that the Examiner has not shown a *prima facie* case of obviousness in the present case. Ayers and Williams, in combination or standing alone, fail to provide any disclosure, motivation, or suggestion to create a semiconductor covered by an indium tin oxide layer having a thickness of greater than 3000 Angstroms, as recited in Claim 20. Further, neither reference provides any recognition of potential corrosion issues associated with a photoelectrode having a semiconductor surface covered with ITO, thus neither Ayers nor Williams provides any suggestion or motivation to one of skill in the art to provide an ITO layer at greater than 3000 Angstroms to address this issue. Applicants respectfully submit that the Examiner has not shown a *prima facie* case of obviousness for Claim 20, and Claims 22, 25, 36, and 37 which depend therefrom, and hence Claims 20, 22, 25, and 36-37 are not rendered obvious over Ayers in light of Williams. Accordingly, Applicants request that the Examiner withdraw these rejections and reconsider the claims.

Claim 23 and its dependent Claims 26-32 are also patentable over Ayers in light of Williams. Claim 23 recites a photoelectrode having a semiconductor layer having a major surface coated with an indium tin oxide (ITO) layer in the form of a highly oriented film. Ayers generically lists suitable materials for coating a photoelectrode, that may include indium and tin oxides (col. 3 lines 61-65). However, in accordance with the inventive concepts of the present invention, highly oriented ITO films contribute to improved corrosion resistance. There is no disclosure, suggestion, or motivation to provide a semiconductor layer having a major surface coated with a highly oriented ITO film in Ayers. Particularly, Ayers fails to recognize any issues with corrosion of a

photoelectrode in a photoelectrochemical cell, and hence provides no motivation or suggestion to improve the corrosion resistance of materials associated therewith.

Further, as discussed above, Williams does not disclose, suggest, or provide motivation for including a semiconductor layer coated with any TCO, nonetheless with a specific material, namely an ITO layer having a highly oriented film. Applicants respectfully submit that the Examiner has failed to provide references that disclose each and every limitation of the claims, particularly any reference that discloses a highly oriented ITO on a semiconductor of a photoelectrode, and as such, has failed to establish a *prima facie* case of obviousness. In addition, there is no disclosure, suggestion, or motivation to combine Ayers with Williams to arrive at the claimed invention in Claims 23 and 26-32. Thus, Applicants respectfully request withdrawal of the rejections to these claims for reconsideration and allowance of the claims.

ALLOWABLE SUBJECT MATTER

The Examiner indicated that Claims 22, 24, 33-35 would be allowable over the cited art of record if rewritten in independent form. Applicants thank the Examiner for the thorough consideration of the claims and allowance of the indicated claims.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office

Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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